

Syllabus

Department/ Academic Unit Biology

Course prefix Bio 499 - Biomechanics

Term/ Year Spring 2017

Course Pre-requisite(s), Bio Co-requisite(s), Co-convened, and/or Cross-Listed Courses: BIO 334

Mode of Instruction: Face to face

Instructor's Name Dr Natalie Holt

Instructor's Contact Information: Natalie.Holt@nau.edu

Instructor's Availability: Office – Biological sciences 426

Office hours - Tues 1.00-2.00pm, Wed 11.10-12.10am

Course Purpose: This course contributes to the Biological Sciences and Exercise Science degree programs. It integrates anatomy, physiology and mechanics to explore the principles of human and animal movement. It highlights the diversity of techniques required to study the physics of movement.

Course Student Learning Outcomes:

By the end of this course you should understand how metabolic energy is converted into animal movement and be able to describe these movements.

This will require you to:

Know and be able to use the basic physics applicable to studying movement

Be able to describe basic properties, functions and interactions of the main elements of the musculoskeletal system in movement

Be able to describe the kinematics and kinetics of movements

Be able to integrate kinematics, kinetics and an understanding of the musculoskeletal system to predict joint torques and muscle forces

Be able to use models to describe the mechanics and energetics of movement

In addition you should:

Understand how to use primary literature

Have an awareness of a range of biomechanical techniques and be able to evaluate their use

Be able to design experiments to test biomechanical hypotheses

Assignments/ Assessments of Course Student Learning Outcomes:

Assignment - Mock biomechanics research paper

Choose a biomechanical question you are interested in. Read some peer reviewed and primary literature on the topic. Formulate a specific, testable hypothesis. Devise an experiment to test this. Write a mock research paper (~ 4 pages in length)

This assignment allows you to show your understanding of an area of biomechanics, design and test a hypothesis, demonstrate your awareness of and ability to evaluate different techniques and show your understanding of the structure and use of primary literature.

Mid-term exam - Problems and short answer questions 25%

This will allow you to demonstrate your grasp of the basic physics applicable to the study of movement, knowledge of how the musculoskeletal system produces movement, and ability to describe movement

Final exam - Short answer questions and a choice of essay questions

This will allow you to demonstrate your basic knowledge of all areas covered and to show an integration of concepts covered in the course and incorporation of primary literature into your answers.

Grading System:

Research paper proposal presentations (5%)

Mock biomechanics research paper (30%)

Mid-term exam (25%)

Final exam (40%)

Grades will be based on

A = 90.0-100%

B = 80.0-89.9%

C = 70.0-79.9%

D = 60.0-69.9%

F = 0-59.9%

Readings and Materials

Recommended reading - 'The neuromechanics of human movement' by Roger Enoka 5th Edition

Class Outline or Tentative Schedule

Week beginning	Topic	Deadlines
8/28	Introduction to biomechanics	
9/4	Motion and forces (labor day 9/4)	
9/11	Energy and material properties	
9/18	Mechanics of musculoskeletal elements	
9/25	The musculoskeletal system in movement	
10/2	Musculoskeletal measurements	
10/9	Gait kinematics	
10/16	Revision sessions and midterm	
10/23	Rigid body kinematics	
10/30	Proposal presentations	Paper proposal due 10/30
11/6	External forces (Veteran's day 11/10)	
11/13	Internal forces	
11/20	Inverse/ forward dynamics (Thanksgiving 11/24)	Research paper due 11/20
11/27	Joint work and power	
12/4	Revision sessions	
12/11	Finals week	

Class Policies:

Attendance

You are expected to attend all classes and complete the required work to meet each deadline. You are responsible for all information, announcements, handouts, and materials given in class. You are expected to be on time for class.

Late work

One full grade will be deducted for each day the work is late. Work turned in more than 3 days late will receive a grade of zero.

Challenging exam questions

Should you feel a question was unfair or unclear, you may challenge the question up to one week after exam scores are released. However, in order to do so you must:

1. Make an appointment to discuss and demonstrate why the question was unfair or unclear. This will be done on an individual basis; no group appointments will be allowed.
2. You must **effectively** and **professionally** argue your point.
3. Email explanations will not be accepted.

I will assign credit to those that can **effectively** and **professionally** argue their point.

Make-up exams

Make-up exams will only be given if arranged ahead of time (e.g., Institutional accepted absence) and/or with the proper documentation in the case of an emergency (e.g., note from your physician or Student Life). I do not necessarily need to know the details of your absence, so if you are not comfortable discussing this please acquire documentation from Student Life. If arrangements have not been made and you have failed to contact me **within 48 hrs** of missing the exam you will receive a grade of zero on the exam.

Academic dishonesty

General Responsibilities

1. A student shall in no way misrepresent his or her work.
2. A student shall in no way attempt to achieve a grade through fraudulent or unfair means.
3. A student shall not in any other manner violate the principle of academic integrity.
4. A student shall report any observed violations of the academic integrity policy.

Examples of Violations

The following actions are examples of activities that violate the Academic Integrity Policy. This is not a comprehensive list.

Cheating is the intentional use of, or attempted use of, unauthorized materials, information, study aids, or previously prepared solutions in any academic exercise, exam, paper or other assignment. Cheating includes, but is not limited to the following acts:

- Copying another student's work.
- Sharing answers for either a take-home or in-class examination unless specifically and explicitly allowed.
- Using notes, books or web materials in an exam when such aids are forbidden.
- Taking an examination in another student's name or having another person take one for a student.
- Changing the answers in an examination after it has been graded in order to gain more credit than deserved.
- Possession of a "cheat-sheet" or other prohibited assistance (calculator, cell phone, text messaging, etc.) during an examination.
- Working on an examination outside the specified time limits, such as beginning before the faculty member directs students to begin, or continuing to work after the faculty member has declared an end to the examination period.
- Using a commercial service or engaging another person (whether paid or unpaid) to prepare assigned work. Unless prohibited by the faculty member for educational reasons, editing and/or proof-reading by another person is not considered cheating.

Northern Arizona University regards acts of academic dishonesty—including, but not limited to, plagiarism, cheating, fabrication, forging an instructor's signature, stealing tests, copying themes or tests from other students, or using "cheat sheets"—as very serious offenses.

If you are charged with academic dishonesty, you are subject to the Arizona Board of Regents' Student Code of Conduct and procedures established by Northern Arizona University, specifically the Academic Dishonesty policy, that are outlined in the [Online Student Handbook](http://home.nau.edu/studentlife/handbook.asp) (<http://home.nau.edu/studentlife/handbook.asp>).

Depending on the infraction, the following actions may be taken, but are not limited to:

- Educational assignments such as completion of an academic dishonesty tutorial or a learning module
- Reducing the grade on the assignment or examination
- Awarding a grade of zero or "F" on the assignment or examination
- Reducing the final grade in the course by one letter grade
- Awarding a failing grade in the course
- Warning the student in writing about the incident

The Instructor of the course will determine which course of action is most appropriate for the infraction.

University Policies

Please refer to: <http://www4.nau.edu/avpaa/policy1.html> for a full list of University Policy Statements regarding the Safe Working and Learning Environment, Students with Disabilities, Institutional Review Board, and Academic Integrity.

NAU has partnered with Follett to create the Emergency Textbook Loan program. The program is administered by the LEADS Center. The program assists students with unmet financial need in obtaining required textbook(s) and other materials for courses. Students must apply and meet eligibility criteria before textbooks are purchased on their behalf. Textbooks must be returned at the end of the term in which the textbooks were loaned. More information can be found online: <http://nau.edu/LEADS-Center/Textbook-Loan-Program/>